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U. S. DEPARTMENT OF AGRICULTURE.
DIVISION OF STATISTICS.



A MANUAL OF INSTRUCTIONS
for Crop Correspondents

TO

CROP CORRESPONDENTS.

BY

HENRY A. ROBINSON,
STATISTICIAN.

NEW EDITION, REVISED AND CORRECTED.

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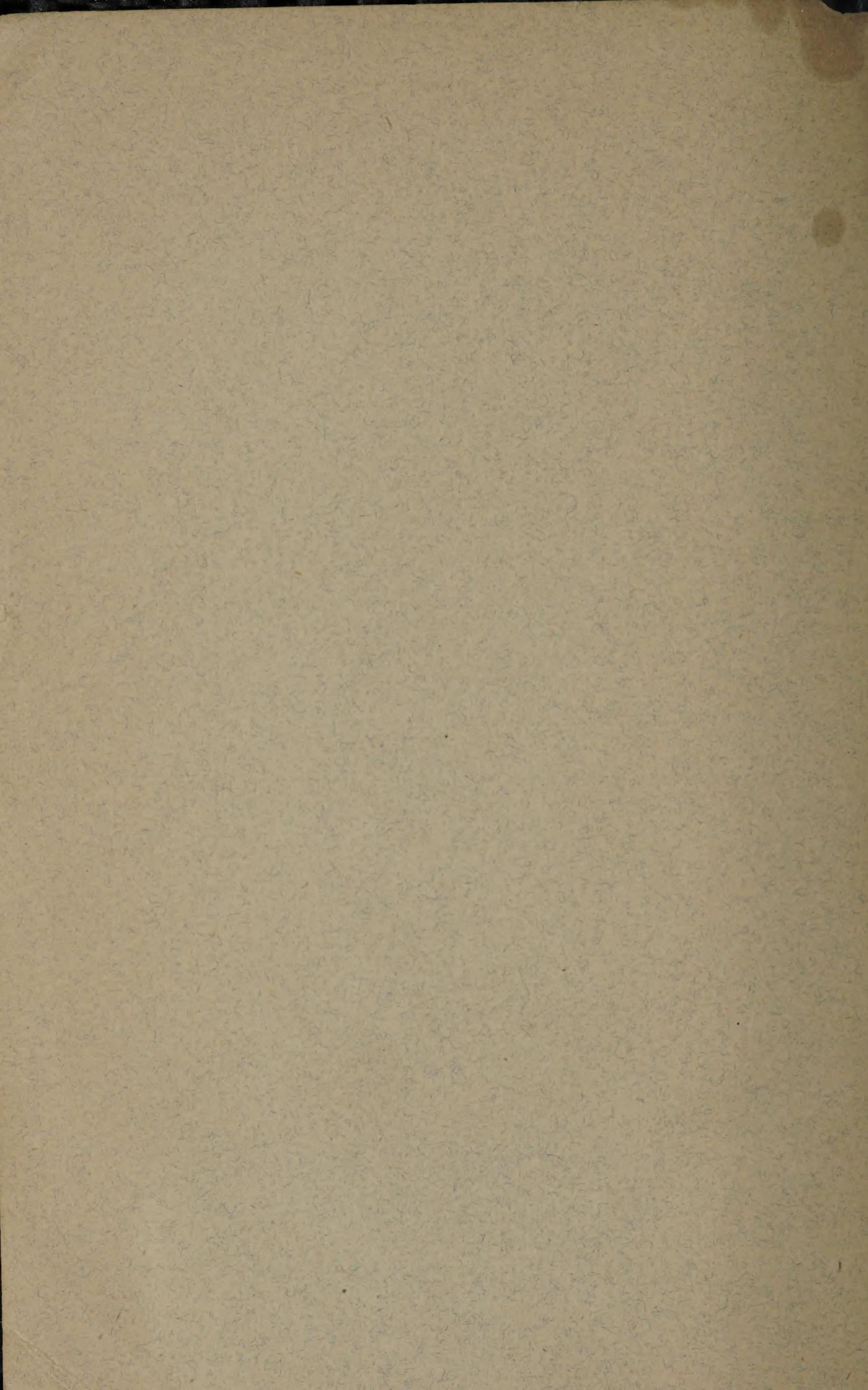
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A MANUAL OF INSTRUCTIONS

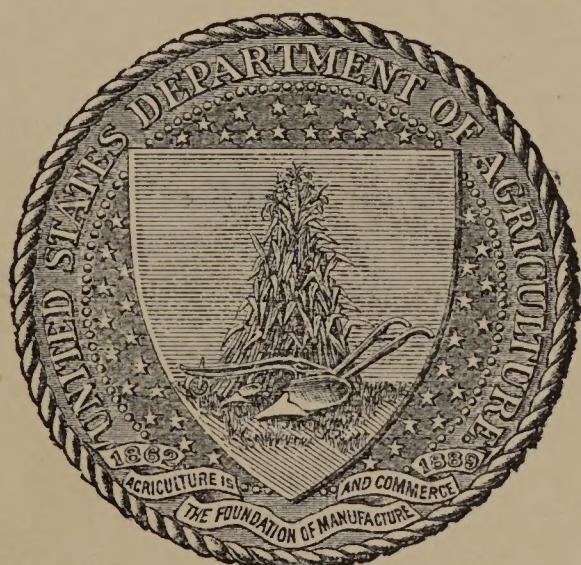
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WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1896.

LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
DIVISION OF STATISTICS,
Washington, D. C., April 29, 1896.

SIR: I have the honor to transmit herewith for publication the revised and corrected copy of a manual designed for the guidance of the crop correspondents of this division in replying to the circulars of inquiry addressed to them from time to time. Its purpose is to secure a systematic and uniform method of crop reporting. A recent extension of this system to include a large corps of township correspondents has exhausted the first edition. The work has been carefully revised and the copy now submitted has received the modifications necessary to adapt it to the increased force and improved methods of the division.

Very respectfully,

HENRY A. ROBINSON,
Statistician.

Hon. CHAS. W. DABNEY, Jr.,
Acting Secretary.

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A MANUAL OF INSTRUCTIONS TO CROP CORRESPONDENTS.

INTRODUCTORY.

In the work of consolidating the returns furnished to the United States Department of Agriculture by its statistical correspondents, and deducing from these returns general conclusions as to the areas under the several crops, the condition of each crop from time to time during the growing season, the product finally obtained, and other matters, it is, of course, assumed that all correspondents follow the same plan, for otherwise the accuracy of the final conclusions reached in the office of the Statistician must be unfavorably affected.

Although a large majority of the correspondents are entirely familiar with the system upon which they report, there may be some who from lack of experience, or through never having seen any detailed explanation of the system, are more or less deficient in their knowledge upon certain points; and, so far as this is the case, it is likely to detract from the desired uniformity of method.

In framing the questions sent out in the circulars issued by the Department care is taken to make them as direct and explicit as possible; but these circulars have not sufficient space for detailed explanatory matter, while the explanations of our crop-reporting system which have sometimes appeared in the monthly reports of the Statistician are not in a convenient form for ready reference, being intermixed with articles on other subjects. Indeed, this circumstance may have caused some correspondents to overlook them altogether, while others, appointed since they were published, may be unaware of their existence.

These considerations, coupled with the desire to secure greater accuracy of results by introducing some improvements, have suggested the preparation of a manual devoted to the subject of crop reporting, and published in a form convenient for preservation and reference. The result is herein presented to the statistical correspondents of the Department, with a view to facilitating their public-spirited labors, the groundwork for all its crop statistics, while rendering those labors more valuable by assuring precision and uniformity in their direction.

The list of correspondents was never so nearly complete as now. They represent almost all producing counties, and include, in all, not

less than 45,000 persons who are studying local crop aspects and indicating the prospects of production. It is for the interest of farmers and consumers—of all, except speculators—that crop news shall be as accurate as possible, and the Department counts with confidence on the continued cooperation of its correspondents in the effort to reach the highest attainable standard. Their past services are appreciated by the Secretary, the Statistician, and the public generally, and the thanks of the Department are cordially extended to them on its own behalf and that of farmers of the country.

GENERAL SUGGESTIONS.

1. Use the circulars received from the Department only for the returns for which they are intended. Make all other communications, including changes of address, requests for seeds, etc., on a separate sheet, of fair size, dated, showing *county*, as well as State and post-office; and when the latter is not in the county for which the report is made, the fact should be stated. The signature should be followed by the words "Statistical Correspondent."
2. Each principal county correspondent is instructed to select three or more assistants in different parts of the county he represents, to whom he will distribute such blank circulars as he may receive, calling for information relative to the condition of the crops and other subjects. Those reporting for townships, precincts, election districts, etc., and not receiving circulars for distribution, are not asked to appoint assistants.
3. *Assistant county reporters will in all cases make their returns to the principal*, who will compile a report to be forwarded to the Department by averaging the figures and statements of his aids, with such modifications as the extent of territory and amount of product covered by each aid and other circumstances within his own knowledge and judgment may dictate. *The reports of assistants should not be forwarded to the Department.*
4. No record of appointments, resignations, or any other changes among assistant county correspondents is kept at the Department. Their addresses are asked for when it is desired to communicate with them directly, and need only be given in response to such requests.
5. Each principal county correspondent, and each township correspondent, should retain a duplicate copy of his report for future reference, an extra blank being furnished for that purpose.
6. It is of the utmost importance that the township and principal county correspondents should mail their reports to the Department as nearly as possible upon the day indicated, as tabulations are made from them for publication, and the reports can not be delayed for those which are not promptly returned. (See paragraph 10 under "Report for January.")
7. The reports and bulletins of the Department, when published in editions of sufficient size, as well as such new and valuable seeds, etc.,

as are distributed from time to time, will be sent to each principal county correspondent for himself and his assistants; and also to township correspondents.

8. In all cases where a crop mentioned in the circulars of the Department is not raised in the county, or is raised to so small an extent as not to be worthy of notice, the character \times may be used in place of figures; but when the reporter simply has not sufficient data for an estimate, the space should be left blank. A cipher (0) indicates an entire failure, in reports of condition; entire exhaustion, in reports of stocks on hand; entire worthlessness, in reports of value, etc. *Please observe this distinction.*

9. In the prosecution of their work as crop reporters, correspondents are invited to note down, with brevity and clearness, any striking fact illustrative of the crop conditions which they report by percentage—any peculiarity of weather, drought, or excessive moisture, prevalence of insects, or other condition favorable or unfavorable to production. It will give a clearer idea of the status of the growing crop and assist greatly in an accurate interpretation of the returns.

REPORT FOR JANUARY.

10. It will be convenient to consider the work of the year in the order in which its results are published, beginning with those which appear in the report of the Statistician for January-February. These relate to the number, average price, and aggregate value of farm animals. The circular upon which the returns on this subject are made is distributed in the month of December, with a view to its return so as to reach the Department as early as the 2d or 3d of the following January. For this purpose it is necessary that it be returned from the Pacific Coast on or about the 24th of December and from nearer points proportionately later, so that from those portions of the country containing a large majority of the population it suffices to forward it on January 1, the date to which the returns relate.

11. The returns as to the number of each class of animals are made in the form of a percentage of the number existing at the same date in the preceding year. The number at that date is represented by 100. If the correspondent estimates that there has been an increase of 5 per cent in the number, he sets down 105 in the proper space in the circular; if he estimates that there has been a decrease of a like percentage, he sets down 95, and so on.

12. As the correspondent does not make an actual enumeration of the animals, he will necessarily be largely guided in his estimate by his knowledge of circumstances tending to cause an increase or a decrease in the number. He will have to consider the effects of demand and price, whether in causing animals raised for food to be marketed more or less freely, or in encouraging farmers to rear an increased number of such animals, with a view to good prices at a future day rather than

the smaller benefit to be had by an immediate sale. The supply and price of forage and the circumstances of farmers, as tending to induce the one course or the other, will claim attention. The favorable condition of prices which leads a farmer in straitened circumstances to fatten and sell his available hogs for slaughter may induce another, who can better afford to wait, to save an increased number of sows for breeding purposes, in the hope that the same favorable condition may continue until he has a much larger number of hogs to fatten. It is not necessary to multiply illustrations. As practical farmers, the statistical correspondents of the Department are familiar with the conditions which tend to cause increase or decrease, whether depending on demand and price, supply of feed, the presence or absence of contagious or infectious disease, the financial situation of farmers, or other circumstances. And not only will they consider these points, but they will, as far as practicable, learn the actual facts of increase or decrease among their neighbors and other farmers with whom they have opportunity of speaking on the subject.

13. In counties where population is growing by the incoming of new settlers, this fact will be likely to have its influence on the number of live stock. Such settlers often bring horses and other stock with them, or they occasion a demand which leads to the introduction of stock by others.

14. The movement of stock across county lines, which sometimes occurs in consequence of unusual scarcity of forage in one district and comparative abundance in another, merits particular attention in those exceptional seasons in which it becomes important from its magnitude. The records of stock shipped from or brought into a county by rail may in such cases afford a valuable means of information.

15. The figures on prices of farm animals are interesting in themselves, and derive additional importance from the means they afford for comparison between the prices in different States and sections, and the basis they thus furnish for a judgment as to the action of climate and other circumstances affecting the cost of maintenance, attention to the improvement of breeds, care, shelter, and proper feeding, and nearness to or remoteness from the markets to which a surplus must ultimately be sent. Then, too, they form, in connection with the statistics of number and the estimated proportions of the animals of different ages, etc., in each species, a basis for the statistics of total value.

16. The question as to the number of sheep killed by dogs, included in the circular on farm animals, deserves careful attention. The figures for the different States, as compiled from the answers to this question, may, when examined in connection with the policies of those States in respect to permitting or restricting the multiplication of dogs, show the effect of laws for the taxation of these animals, or of other measures having a like end in view, in affording protection against such depredations.

REPORT FOR FEBRUARY.

17. The circular of questions returnable February 1 relates to cotton, and is intended to elicit the information necessary to make a report upon the crop of the preceding year. This report will not be final, because it can not include a complete statement of the movement and consumption of the crop; but it will be made as exact as possible.

REPORT FOR MARCH.

18. A circular issued in February, and made returnable February 25 from the Pacific Coast or March 1 from other portions of the country, contains inquiries which, as set forth in the circular itself, "are intended to ascertain approximately the proportionate consumption or distribution of the crops of corn and wheat on the 1st of March, * * * and to show whether they have been greater or less than usual, * * * thus indicating the comparative stocks on hand for future use." The data furnished by this investigation may be useful to farmers having a surplus for sale, in judging whether to sell it at the prices current at the time or to hold it for a better market. It is, therefore, of great practical importance that the estimates be made with care and judgment and based upon as full information as it is practicable to obtain.

REPORT FOR APRIL.

19. The circular returnable April 1 relates to the condition of winter grain and of farm animals. In relation to grain it contains inquiries as to the date of seeding, the conditions under which it took place, the effect of the winter on the condition of the plant, the degree of protection afforded by snow, the extent of the damage, if any, done by the Hessian fly, and the condition of the growing crop at the date of the report. As this return includes the figures on winter wheat and has an important bearing on the probable character of that crop, it merits special care and attention. Suggestions as to the reporting of condition will be given further on.

20. See paragraph 9, under "General suggestions," in regard to noting the effects of weather, insects, etc., on the growing crops. This is especially important in those parts of the country where the season is well advanced at this date.

21. In relation to farm animals, the circular contains inquiries as to the comparative health of horses during the twelve months ending with the date of the report (April 1), the comparative condition of cattle, sheep, and swine at the date of the report, the diseases, if any, which have been unusually prevalent among animals of each species mentioned, the number in every thousand that have died during the year from disease (in the case of horses and cattle), from winter exposure (in cattle and sheep) and from all causes (in cattle, sheep, and swine), and

finally, the number of breeding sows on hand compared with the number on hand at the same date the preceding year.

22. The estimate as to health of horses and condition of cattle, sheep, and swine is made in the form of a percentage. Normal health or condition¹ is represented by 100, and extraordinary freedom from disease or unusual fullness of flesh might require a figure somewhat above 100, while an unusual prevalence of disease or poorness in flesh would require a figure falling below 100 in a degree corresponding to that in which healthfulness or condition falls short of the normal standard. If there is due care and judgment on the part of the correspondent and a solid basis for his estimate in the form of a good knowledge of the facts, these reported conditions will be of much value in comparing one year with another.

REPORT FOR MAY.

23. The circular returnable on the 1st of May calls for a further report on the condition of winter grain—wheat, rye, and barley. In a few counties of the extreme South this may be the last report on the condition of small grain. In others the crop is by this date well advanced, and unless injured in ripening its condition at this time will give a fair indication of the yield. The bulk of the crop is grown in States in which the harvest occurs at a later period; but much interest attaches to the condition of the growing crop everywhere, especially the wheat crop. In order that this return may have greater precision, two questions are added with regard to wheat—as to the normal yield or full crop or satisfactory crop (see paragraph 64, below) of the locality, and as to the yield indicated by conditions now prevailing. The reported condition ought to be exactly the ratio of the second yield figure to the first; it always will be when there is no error in the returns.

24. The condition of spring pasture and the proportion of plowing done up to May 1, as compared with the proportion done up to the same date in an average year, are among the important data called for by this circular. The question in relation to spring plowing relates to all plowing in preparation for the planting of any of the spring crops, but of course does not refer to any done in the after cultivation of the growing crop.

25. Still another item of great interest on which returns are made at this date from the cotton-growing States is the proportion of the proposed area already planted in that crop and the proportion planted by the same date in an average year. The returns under these two heads show not only the proportion of the crop that is in by May 1, and whether this is greater or less than in average years, but also whether the season is earlier or later than usual, which is an important element in calculating the chances of the crop. In the same circular is also an

¹By "normal health" is meant freedom from any unusual disease and from an unusual prevalence of any disease whatever. "Normal condition" is such a condition as is common at the same date in ordinarily favorable years.

inquiry whether the total area under cotton is likely to be greater or less than that of the preceding year, the answer being expressed in the return as a percentage of the area of the previous year.

26. Another inquiry relates to crop areas and any tendency to change their usual proportions that may be noticeable. The probable increase or decrease in the area under any crop is asked for, and also a statement of the cause for the anticipated change. This return affords an indication on the subject of acreage in advance of the formal figures on that subject. Experienced correspondents will, of course, be on their guard against exaggerated views of slight or temporary tendencies to increase or decrease; but where such tendencies are at all marked it is very important to note them, since, in the aggregate, they show how the farmers of the country are adapting their course to the peculiarities of the season, the state of the markets in which their produce finds sale, or to other conditions on which their success is dependent.

27. It is especially advisable, from this time on, through the growing season, to note with care those peculiarities of the weather and other causes by which the condition of the growing crops is so largely determined. (See paragraph 9 on this point, under the head of "General suggestions.")

REPORT FOR JUNE.

28. The circular returnable on the 1st of June derives peculiar importance from the fact that it is the one on which are made the returns as to the area under wheat, rye, barley, oats, and clover, and also rice where that cereal is grown.

29. The annual returns on area, as proved by the figures of subsequent State or national censuses, have been sometimes too low and sometimes too high, for a tendency to a conservative estimate may have either effect according as the movement is actually toward greater or less acreage. In counties that are growing in agricultural population, whether by natural increase or by immigration, and in which the aggregate area under cultivation is undergoing a progressive enlargement from that cause, this circumstance should not be overlooked in making estimates for the different crops, especially those to which newly broken ground is most apt to be devoted. In sections where there is a progressive abandonment of a crop, on the other hand, because the product from its readier importation has ceased to pay, reporters should observe this tendency and be on their guard against excessive estimates.

30. The returns on area are made in the form of a comparison with the area of the previous year, no change being represented by 100 and an increase of 5 per cent being indicated by returning the present acreage as 105, while a decrease of 5 per cent is indicated by a return of 95; and so for other percentages of increase or of decrease. The Department is desirous of obtaining fuller and more detailed information on

this vitally important point than has hitherto been furnished, and its correspondents are invited to communicate any facts that they may know of, bearing on changes in crop acreage.

31. The same circular contains an inquiry as to the average condition of wheat, rye, barley, oats, clover, spring pasture, apples, peaches, cotton, and rice on the 1st of June. The returns on this subject are made in the form of a percentage of full or normal condition. (See "Reports on condition," beginning with paragraph 61.) Particular attention is called to the inquiries as to "normal yield" and "yield now indicated"—that is, rendered probable by state of weather, growth and health of plant, etc.—here added, for the principal crops, to insure greater precision. The proportion of the indicated to the normal yield ought to give the reported condition precisely; it always will, unless there is an error in one of the three numbers. Yield of cotton will be given in pounds of lint. Those who find it easier to make first estimates in the seed will divide such estimates by 3; this will give weights of lint, nearly enough.

32. Other questions contained in this circular relate to the date at which sowing or planting of spring wheat, rye, barley, oats, and cotton begins and ends. Correspondents are requested to give the average date of planting, taking one season with another. The first date should show when, under ordinary conditions, planting would be expected to begin, and the last should show when regular planting should be finished. Close of planting refers to the end of the regular planting, and not to replanting for a complete stand. See paragraph 9 under "General suggestions" in regard to noting the effects of weather, insects, etc., on the growing crops.

REPORT FOR JULY.

33. The circular returnable July 1 calls for the comparative area under crops, which, in some parts of the country, are not fully planted by the 1st of June. These include corn, potatoes, sweet potatoes, beans, sorghum, and tobacco. It also calls for the average condition on July 1 of these crops, that of all the grain crops not harvested prior to that date, and that of cotton, clover, timothy, pasture, apples, peaches, and grapes. The same circular contains an inquiry as to the quantity of wool sheared compared with that of the preceding year and the average weight of fleeces in pounds.

34. The reports on the condition of wheat, rye, barley, and oats made in this circular will, in a large portion of the country, be the last on that subject prior to the harvest, and, if carefully made, will afford the means for a pretty accurate forecast of the yield of these crops within that belt of territory, subject, of course, to the possibilities of adverse weather conditions between July 1 and the garnering of the grain. Particular attention is called to the requests for "normal yield" and "yield now indicated." (See paragraph 31, above.)

35. In this report is also included the last return from the wheat crop of the preceding year, the percentage still on hand July 1. On most farms the old stock will at this date be substantially exhausted, and it will very rarely amount to 10 per cent on the average for the whole country; but it is desirable to ascertain precisely the wheat reserve at its lowest point.

36. The remark under "General suggestions" as to the careful observation of the effects of weather, insects, etc., is at no time more important than now. Where grain, hay, or clover is cut in June, the condition of the weather during harvest and the condition in which the crops are secured should be reported. If the harvest is completed the fact should be stated, and if not, its stage of progress should be indicated, the crops being specified.

REPORT FOR AUGUST.

37. The circular returnable August 1 provides for a report on the area under buckwheat, the normal and indicated yield of the leading crops, the average condition of all growing crops, including fruit, and of pasture, the product of clover expressed as a percentage of a full crop, and the average quality of clover hay, also expressed as a percentage, high quality being represented by 100. Careful observation on the character and effects of the weather, and on insects or other agencies affecting the condition of growing crops, continues to be important. The condition of the weather during harvest and the condition in which the crops harvested during July have been secured should be reported, as also the stage of the harvest where it is still in progress. Farm reserves of last year's oats are included in the inquiry. (See explanation in paragraph 35 for wheat.)

REPORT FOR SEPTEMBER.

38. The returns on condition and normal and indicated yield, made in the report returnable September 1 include those relating to the condition of the small grains—wheat, oats, rye, and barley—when harvested. These returns are of great importance as furnishing one of the elements for an estimate of the product of these crops, and they consequently demand the utmost care both in collecting the necessary facts and in making up from these facts a judgment as to the average condition for the territory covered. The whole subject of reporting on condition is more fully discussed further on, beginning with paragraph 61.

39. The reports for this date on the condition of corn and other crops still outstanding in a large part of the country are near enough to the time for the gathering of those crops to have especial significance as indications of the probable amount and quality of the yield. Storms, early frosts, or other adverse influences may of course prevent the

fulfillment of expectations based on these reports, but they are not often sufficiently general to affect materially the crop in its entirety.

40. This circular also contains inquiries on the following points:

(a) The product of the peach crop compared with that of a normal year.

(b) The number of hogs for fattening compared with that of the previous year.

(c) The average condition of hogs as to weight and size.

(d) The acreage in clover seed compared with that of the previous year.

(e) The condition of the clover-seed crop.

(f) The percentage of the previous year's cotton still on hand. It is necessary to discover the amount of this small balance in order to square accounts with last year's crop.

41. Space is left for "Remarks" upon the circumstances affecting the growth and maturity of products named in the schedule and on causes of failure, etc. In those parts of the country where the small grains are harvested wholly or partially in August, reports as to the harvest and its conditions should be made under the same head. General statements relating to such specialties as cranberries, hops, flax, hemp, etc., will also be interesting.

42. In reporting on the number and condition of stock hogs for fattening, the various circumstances by which an increase or decrease has been promoted, such as the price of pork, the comparative scarcity or abundance of feed, and the prevalence of disease or its comparative absence, should be considered and should be mentioned in the remarks accompanying the numerical return.

REPORT FOR OCTOBER.

43. The circular returnable October 1 is especially important. It contains inquiries as to the average yield in bushels and average quality of wheat, rye, oats, and barley; as to the normal and indicated yield of corn, potatoes, and lint cotton, in bushels or pounds per acre; and as to the product of hops compared with a full crop, the yield of hops per acre in pounds, and their average quality compared with high medium grade. It also asks the condition of crops still growing, including corn, buckwheat, rice, potatoes, sweet potatoes, tobacco, sorghum, other sugar cane, and cotton.

44. The questions in regard to condition are answered as usual in hundredths of full condition, and those in regard to quality in hundredths of high medium grade, a grade usually denoted No. 2 on produce exchanges—good, only not "extra."

45. The questions in regard to the average yield per acre of wheat, oats, rye, and barley are especially important. The returns on comparative acreage made in an earlier schedule furnished one of the elements from which the total product is calculated. The returns on

condition at harvest furnish an important indication on the same point, and those on yield per acre should furnish a still more precise one. If these last and the previous returns on acreage are both correct, the two together supply the factors from which the total product can be correctly computed; and if the condition at harvest was also correctly estimated, the indication furnished by that estimate will harmonize with the results obtained by computation from the acreage and yield.

46. It must be borne in mind that the yield per acre wanted is not the yield on the best farms, but the average yield for the entire area harvested, from that on which the crop was most abundant down even to absolute failure, if a failure occurred on areas comprised in the aggregate acreage returned. But the mean between the two extremes must not be taken as the true average. Thus, if the lowest yield of wheat were 5 and the highest yield 45 bushels per acre, the mean would be one-half of the sum of these two quantities, or 25 bushels per acre; but the true average would usually be something less, because the areas with comparatively low yields are usually more extensive than those with high ones. The true average is that which would be obtained if the entire wheat product of the county, expressed in bushels, were divided by the entire number of acres from which it was obtained; and the same is, of course, true for other crops. It is important that this be carefully kept in mind, as otherwise the tendency would be to estimate the average yield per acre too high. The subject is more fully considered further on under the head of "Reports on condition and yield."

47. The inquiry concerning the "condition" of cotton is made as in circulars of previous months, and as it is the last of the season it is one of great importance, indicating closely the result of the harvest with a season of average length and medium weather for picking. The question concerning "indicated yield" affords a parallel test of comparative production, whose value obviously depends on the care with which the estimate is made. As a variation of some 25 pounds per acre in the general average will make a discrepancy of 1,000,000 bales in the total, sound judgment is highly important. The question will be understood by all, and a serious inaccuracy is not feared if the inquiry be deliberately considered.

REPORT FOR NOVEMBER.

48. The circular returnable November 1. calls for the average yield per acre of corn (shelled), potatoes, sweet potatoes, tobacco, hay, buckwheat, cotton (lint), sorghum (sirup), and rice. The yield of corn, potatoes, sweet potatoes, buckwheat, and rice is stated in bushels, that of tobacco and cotton in pounds, that of hay in tons, and that of sorghum sirup in gallons. In the more important of these crops the average quality expressed in hundredths is called for. A final return of the stock of old corn still on hand, in the form of a percentage of last year's total crop, is also requested; as in paragraphs 35 for wheat and 40 (f) for cotton.

49. The indicated product compared with that of the preceding year is called for in the case of cotton and sugar cane, other than sorghum, while the product of grapes, apples, and pears is to be reported in the form of a percentage of a normal crop, by which is meant a reasonable estimate of a fairly full crop in the particular county or township.

50. What has already been said as to the importance of the estimates on yield per acre in the case of small grains (see paragraphs 45, 46) is equally applicable to the crops here considered. It will also be borne in mind that the estimate of the total crop of a county in comparison with that of the preceding year is apt to be too low, for a full or normal crop is sometimes mistaken as the standard of comparison, so that a tendency to underestimation will need to be guarded against when the estimate is returned in this form.

51. Particular attention is called to the two cotton questions. The first requires an estimate of the number of pounds per acre indicated by the condition of the crop at the date of return, without reference to any former period. The second calls for a comparison with the crop of last year. In taking into account any causes of failure this year, similar or other causes affecting last year's crop should be carefully called to remembrance before the comparison is made.

REPORT FOR DECEMBER.

52. The circular returnable December 1 calls for an estimate of the total product of corn, wheat, rye, oats, barley, buckwheat, potatoes, sweet potatoes, leaf tobacco, hay, cotton, and sorghum molasses, compared with that of the preceding year. It also calls for information as to the average price of each of these products at the date of the return, for estimates as to the areas sown with winter wheat and winter rye, compared with those under the same grains a year before, and for a report as to the condition of these two crops at the beginning of December.

53. The return as to total comparative product is made in the form of a percentage. The product of the previous year being taken as 100, a product just equal to it will be represented here by 100, one one-tenth greater by 110, and one one-tenth less by 90. This estimate refers to the total product without regard to the area on which it is produced. If the township or county produced 1,000,000 bushels of corn last year and 1,500,000 bushels this year, this year's product will be represented by 150, no matter whether the increase is the result of increased area or of a larger yield per acre.

54. The last reports on condition, taken in connection with those on area previously made, and with the figures on the previous year's area and on normal yield, afforded one method of calculating the total product for the year; the returns on yield per acre, taken in connection with the area, afforded another; and now a third is supplied by the estimate comparing the crop with that of the previous year. If the three meth-

ods give results that substantially agree, the fact affords evidence of perfection in reporting; of sound and accurate judgment in all the returns of the year. This is the ideal at which the correspondent should aim. Often there is substantial agreement; sometimes discrepancies more or less marked. These discrepancies require adjustment, for which further investigation is sometimes necessary. Often, perhaps generally, the result by "yield per acre" is higher than that by "product compared with last year." This comes from the two opposite tendencies to error noted in paragraphs 46 and 50. Every effort should be made to avoid both of these easy and prevalent defects.

55. *The new crop.*—The area sown and condition of winter grain should both be given comparatively, 100 representing the acreage sown the previous year, and also a full normal condition of the growing crop, an increase or decrease of acreage or condition being indicated by a higher or lower figure.

56. *Prices.*—A little inquiry, and some subsequent calculation, will enable correspondents to fix upon a price which may be a fair average of prices received at the home markets, the county towns, and local railroad stations. Prices should be stated plainly in *dollars and cents*.

[Paragraphs 57 to 60 omitted in the revision.]

REPORTS ON CONDITION AND YIELD.

61. In reporting condition, 100 stands for a full crop. A crop falling one-tenth short of a full crop is therefore indicated by 90; one falling one-fourth short is indicated by 75, and one in excess by one-fifth is indicated by 120.

62. In British India the number 16 is taken as a standard, a crop one-sixteenth short of a full crop being indicated by 15; one that is one eighth short by 14, etc. This method appears to have been adopted because the Indian monetary unit, the rupee, is divided into 16 annas, and the people are, therefore, most familiar with reckonings by sixteenths. It is, in fact, customary there to speak of a full crop as a 16-anna crop; a crop deficient by one-eighth as a 14-anna crop, etc. This figurative application of the name of a piece of money to the crop is frequently met with and is rather mystifying to those not acquainted with the reason for the practice adopted.

63. Our own division into hundredths coincides with the division of our dollar into cents, as the Indian division into sixteenths coincides with the division of the rupee into annas; but it has the advantage of admitting of finer distinctions than the Indian system, and has a tendency to encourage the habit of making closer observations and noting slighter shades of difference in crop conditions. It has a like advantage in the working out of averages, and on the whole is believed to be conducive to greater accuracy than is attainable by the rougher estimate which a division into sixteenths implies.

64. By the "full crop," for which 100 stands in our system, is meant a crop showing healthy growth and a condition unimpaired by weather, blight, insects, or other damaging agency. It is such a crop as, under these circumstances, would be produced upon the kinds of soil and with the methods of cultivation that are in general use in the county for which the estimate is to be made. It does not represent a crop of extraordinary character, such as may be produced here and there by the special effort of some highly skilled farmer with abundant means and leisure at his command, or such as may be grown on an occasional bit of land of extraordinary fertility, or even such as may be grown quite extensively once in a dozen years, in a season that is extraordinarily favorable to the crop to be rated. A crop produced under any one of these rare and exceptional conditions, and still more one produced under two or more of them combined, may require a higher figure than 100 to represent it. For example, the hay crop, when warm, moist weather in spring and early summer has been followed just in the nick of time by a bright, dry season for the ripening of the luxuriant growth, may easily have a condition above 100 in the section so exceptionally favored; and in the special cases where the exceptionally favorable character of the season is combined with extraordinary fertility of soil, or some other exceptional condition, the excess above 100 would rise still higher. Nor is the "full crop" merely an average crop, the mean product of a series of years. It is, in short, a normal crop, neither deficient on the one hand nor yet extraordinarily heavy on the other. It is the crop which answers reasonable expectation, soil and climate being considered.

65. It has, perhaps, scarcely been necessary to say so much in explanation of what 100 represents. It is believed that in nineteen cases out of twenty the estimator would of his own accord, and almost without giving the matter a thought, adopt as his standard of comparison, and represent by 100, precisely the kind of crop which is here in view. He would not take as such standard an extraordinary crop, such as he sees only once in a long while, nor would he take an average crop, ascertained by adding the yields of several years comprising good, bad, and indifferent seasons, and computing therefrom the arithmetical mean. What he would naturally and almost unconsciously do is to make his comparison with such a crop as is familiar to his sight and to his mind; such an one as he may see anywhere and everywhere about him in any ordinarily favorable season, and in the absence of any appreciable damage from drought, floods, frost, storms, blight, insects, or other injurious agency. If elaborate explanation of what is desired should lead an estimator to distrust this simple, easy, and natural process, which he would of his own accord adopt, it would be mischievous instead of helpful; and to a great majority of the correspondents of the Department it would probably be perfectly safe to say: "In forming your idea of the standard of comparison which is to be represented

by 100 in your estimation of the condition of the crops, just pursue the same plain, common-sense course which you have pursued in the past, and you will then be as nearly right as it is practicable to come." Still, if it be borne in mind that the use of the standard here described does not require any intricate and elaborate mental operation, but simply that exercise of observation and judgment which is habitual with the experienced agriculturist, the discussion of the subject can do no harm, while it may, on the other hand, be helpful to some of the less experienced of our correspondents. It is precisely because this standard of comparison is more easily applied and more natural than any other that the Department has adopted it rather than the average of all crops, good and bad, the crop of the census year, etc.

66. It is, of course, understood that each correspondent has to do simply with his own territory. What is a "full" or "normal" crop in one region is not necessarily such in another. The correspondent in a county or township having a light, thin soil will have a very different standard from that used where most of the farms are on unexhausted prairie loam many feet in depth. What would be a "full" or "normal" crop of corn, for example, in the former would be a very scanty one in the latter. So great may be the difference that the same crop which is properly represented by 100 in the one case would stand for less than 50 in the other; or, if we reverse the cases, the corn crop which in the fertile prairie region would be properly represented by 100 would be so prodigiously large and so far beyond the range of all ordinary experience in the other that, if by some miracle of the seasons it could for once be grown there, in that region it would require more than 200 to represent it. But a correspondent has no occasion to embarrass himself with any consideration of the crops and crop standards of other counties and townships. Each one has to do with what constitutes a full or normal crop in his own territory according to the teachings of familiar experience there; and having mentally represented this full or normal crop by 100, he is to rate the actual condition of the crops at any given time at such a proportional figure as in his best judgment will express its relation to this standard.

67. It is necessary that the full or normal crop should be conceived of in an exact quantitative way. In some cases the correspondent may have for his normal standard the appearance of such a growing crop as may be considered a full or normal one, but before he can make it the basis for a computation as one of the data to be used in obtaining the average normal crop of his entire territory he must determine to what rate of yield such an appearance corresponds. In the case of wheat, for example, he must not only have a mental notion of the appearance of a full crop as it stands in the field, on soil of a particular character, but he must also have a mental estimate of the number of bushels per acre which a crop of such appearance will yield if harvested without loss or impairment. And the formation of the truest

possible estimate on this latter point is well worthy of careful attention and painstaking effort.

68. Where a county or township comprises two or more portions characterized by well-marked differences in quality of soil or general character of cultivation, the accurate determination of the average condition for the whole is not so simple as where the conditions are substantially uniform throughout. The proper method in such a case is for the correspondent to make up his own mind as to what constitutes a full or normal crop in each division, estimate the actual condition of the crops in each on the basis of the standard thus fixed upon, express this condition in hundredths of that standard, and then combine these partial reports into an average for the county or township expressed in hundredths of a general normal. In this work there would be an advantage in having each division, as far as practicable, of a constant area or total productive capacity as well as marked throughout by similar conditions of soil and cultivation. Where this is possible the work of finding a general average is much easier than when a combination of returns from divisions differing considerably in extent and in aggregate crop must be made.

69. For a clearer understanding of these points and of the general method of ascertaining averages, attention is called to a few illustrative examples. If a favorable early summer is succeeded by very dry weather in August, the corn crop will be found to be affected very unequally. In the uplands its growth may be so reduced that the figure expressing its condition is properly put at 40, while in the bottoms the injury is quite imperceptible, so that it may be fairly rated 100. What is the average condition for the whole territory? That depends on the relative amounts of the two growths, or the total corn in the two situations, estimated according to areas and normal yields. If the yield normally to be expected is the same in both divisions, the amount is proportionate to the area; if the areas are equal, the amounts vary with the normal yield in each. But there will usually be some difference in both respects; if, for example, the bottom land normally produces 50 per cent more to the acre and also has twice the total area, then we should credit that growth with three times the amount of corn; whereas the upland, with the same ratio of yield, would have to be of six times the area in order to have four times the normal crop.

70. Determining the relative total products in the manner just explained, we may now proceed to use them in ascertaining the average. If there is just the same amount of upland corn as of bottom corn by this calculation, the returned average should be just halfway between the extremes, or 70 in the case supposed; if there is twice as much of the first growth, the true figure is 60; if there is twice as much of the second, it is 80, and if there is five times as much of one as of the other, the return should be 50 or 90, according as upland or bottom is in excess. These examples, well within the range of probable and even of

actual experience, illustrate very forcibly the need of attending to differences in amount of crop, as well as differences in condition, in the two divisions. It would be a great mistake to report the halfway figure, 70, as the true average in the case considered if the total corn of one growth considerably exceeds that of the other.

71. With these hints on correct methods of estimating and averaging, illustrated by the examples already given, to aid the native intelligence of the correspondent, he will doubtless find little difficulty in deriving and reporting the right yield and condition figures for his county or township. Nevertheless, so desirable is a thorough mastery of these important points that a fuller example has been prepared to illustrate them more completely, and it is advised that close attention be given to the methods used in its solution by all who have to report for regions where diverse conditions of soil, cultivation, exposure, and effect of seasons prevail.

72. Let us suppose that the territory covered by the report has four well-marked divisions, which may be designated A, B, C, and D, whose normal wheat yields are, respectively, 18, 16, 14, and 12 bushels per acre. If these divisions were of equal area the average normal for the entire territory would be one-fourth the sum of those numbers, or 15; but the adoption of a larger acreage in the more fertile divisions requires a higher figure for the true average. If we suppose the estimated wheat area in A to be four times, in B three times, and in C twice that in D, the figures 4, 3, 2, and 1 may be used to represent those divisions without regard to the precise area covered by the unit, which might be a hundred acres, a thousand acres, or some less round figure. For this purpose it is the proportion that concerns us. Finally, let us assume that the condition of wheat has been judged to be 85 in Division A, 90 in B, 95 in C, and 100 in D. We shall then have the results set forth in the table below, where the yield and product corresponding to the estimated condition are given as "indicated" yield and product (see paragraph 31):

1	2	3	4	5	6	7
Division.	Relative wheat area.	Normal yield per acre.	Relative normal product.	Condition percentage.	Indicated yield per acre.	Relative indicated product.
A.....	4	18	72	85	15.3	61.2
B.....	3	16	48	90	14.4	43.2
C.....	2	14	28	95	13.3	26.6
D.....	1	12	12	100	12.0	12.0
Sum or average.....	10	16.0	160	89	14.3	143.0

73. The figures in columns 2, 3, and 5 are those supplied by the suppositions made in last paragraph. The indicated yield in column 6 is found by taking of the numbers in column 3 the percentages in column 5; thus $18 \times 85 \div 100 = 15.3$, and so for the other divisions. The products, columns 4 and 7, are found by multiplying together the

relative areas, column 2, and the yields per acre, columns 3 and 6; thus $4 \times 18 = 72$, $4 \times 15.3 = 61.2$, etc. The figures at the foot of columns 2, 4, and 7 are sums, while those under 3, 5, and 6 are true averages, obtained by division of those sums; thus, $16.0 = 160 \div 10$, $89 = 100 \times 143.0 \div 160$, to the nearest unit (the factor 100 is introduced because a percentage is required), and $14.3 = 143.0 \div 10$.

74. Attention was called above, in paragraphs 70 and 72, to the misleading character of results from the hasty process of adding yield or condition figures together and dividing by the number of them to find an average. That process, it has been shown, would give us 15 instead of 16 for the average normal yield in column 3. In like manner it would give $13\frac{3}{4}$ instead of 14.3 for the average indicated yield in column 6, and $92\frac{1}{2}$ instead of a little over 89 for the average condition in column 5. The true averages, in this example, are brought nearer to the figures for Divisions A and B by the larger areas and wheat products of those divisions.

75. While a certain yield per acre may at any given time be regarded as the normal yield of a county or portion of a county, it would not be safe to assume that it will remain so for a long series of years. As a virgin soil gradually declines in fertility through continuous cropping without returning to it an equivalent for the chemical constituents thus withdrawn, or as an impoverished soil is gradually restored to fertility by improved farming, the normal product changes; for this phrase is here used to mean the product obtainable in an ordinarily favorable season under the conditions of soil and cultivation generally prevailing at the time, and when these conditions change the normal product necessarily changes with them. So, also, the normal average may be affected by change in relative areas. Thus, in the example above, an increase of the area under wheat in Divisions A and B and a falling off of the areas in Divisions C and D would raise the normal average yield of wheat for the whole territory, though the normal yields for its several divisions should remain unchanged.

76. For estimating the yield per acre the results of thrashing afford the most definite and certain basis, but a fair approximation is attainable at an earlier date. For this purpose we may construct a frame which will inclose an exact fraction of an acre, use it to mark off such fraction in some representative field, and having cut the ripe grain within the area so marked off, ascertain its amount, and from that compute the corresponding yield per acre. A frame exactly 11 feet square, which might be made in parts that can be readily and accurately put together when a trial is desired, would contain one three hundred and sixtieth of an acre. If it were found by experiment that the grain inclosed within such a frame yielded $1\frac{2}{3}$ quarts, dry measure, the product of an acre of grain in like condition would be 600 quarts, or $18\frac{3}{4}$ bushels. The yield should be weighed as well as measured, and the weighing would give the better result of the two, not only because

the weight of grain is the more accurate indication of its nutritive contents, but also because in most cases the weight can be more exactly determined. If $2\frac{1}{2}$ pounds of wheat were obtained from the area inclosed within a frame such as has been indicated, the total product per acre for grain of like yield would be 900 pounds. This, at 60 pounds to the measured bushel, would be equivalent to 15 bushels; but the result should of course be reported by weight with all practicable exactness, together with the results obtained by measuring. In this way a means of determining the true weight per bushel would be furnished.

77. What has been said in regard to wheat will apply in essential particulars to the other small grains. In the case of corn, where the rows and the hills are exactly 3 feet apart, an area containing twenty hills will represent exactly one two hundred and forty-second part of an acre; and where the distances between the rows and hills are accurately fixed, no frame or other means of measurement will be necessary. If, for example, the product of twenty hills should be found to be 6 quarts of shelled corn, the yield of an acre of like corn would be $(242 \times 6) 1,452$ quarts, or $45\frac{3}{8}$ bushels. Twenty-two hills of such corn will occupy one two hundred and twentieth of an acre; if it requires 22 hills to produce 6 quarts, the yield per acre is $220 \times 6 = 1,320$ quarts, or $41\frac{1}{4}$ bushels. But this rule must be altered for other distances of rows and hills; if these are $3\frac{1}{2}$ feet apart, twenty hills will occupy one one hundred and seventy-eighth of an acre, very nearly; and if the distance both ways is $3\frac{3}{4}$ feet, this fraction becomes one one hundred and fifty-fifth.



